

## Original Paper

# Monetary Policy Its Instruments and Convergence of Its Objectives: Case of Angola 2005/2017

Antonio, Pitshu Massaka<sup>1\*</sup>

<sup>1</sup> Technical of Modeling and Forecasting in the Economic Research Department in Angola National Bank, Angola

Received: February 28, 2019

Accepted: March 12, 2019

Online Published: April 11, 2019

doi:10.22158/jepf.v5n2p161

URL: <http://dx.doi.org/10.22158/jepf.v5n2p161>

*The Working Papers are works in evolution, whose publication aims to encourage the debate and the deepening of the subjects discussed. The views expressed are those of the authors and do not necessarily reflect those of the National Bank of Angola, nor do they bind the Institution in any way.*

### Abstract

*This paper proposes a new paradigm for the analysis of monetary policy, and presents the monetary policy framework in Angola which includes the policy instruments, and implementation mechanism the way between instrument and objective. To study the Monetary Policy instruments in Angola based on a multiple linear regression model. Before the model was conceived an analogy was made about the politics and instruments of monetary policy from the classical Keynesian model in the matter, but also less important also to analyze the concrete objective of monetary policy if the authors agree connected with those currents of economic thought. For the estimation of the equation for the monetary aggregate M2 that represents the money supply by the Central Bank in Angola The author applied the current implementation and the existing theories to display the Angola monetary tools such as basic interest rate for monetary policy orientation (tbna), open market operation, Lending Facility, coefficient of required reserve, net international reserves, and the Gross Domestic Product, the reference oil price to brent. Most of the variables present the expected results.*

### Keywords

*Monetary Policy, Monetary Policy Instruments, Money Supply by the Central Bank, Coefficient of Mandatory Reserves, basic interest rate to guide monetary policy*

**JEL Classification:** E5, C3

## 1. Introduction

In many central banks, once the Monetary Policy objectives have been defined, they over time are distancing themselves from their reach and tend to assume other objectives, without the procedures in the use of the instruments being adjusted. This practice, instead of making it possible to correct the observed deviations, results in a greater distance in the scope of the objectives initially defined. In this sense, the objective of this paper is to present an empirical analysis of the impact of the instruments and the intermediate variables of the monetary policy. The attainment of monetary policy objectives naturally passes through the use of its instruments, focusing on the intermediate and final objectives and the paths taken to achieve them. Thus, the paper presents three sections, and in section I, the literature review is presented showing different approaches regarding the basic concepts of monetary policy. Additionally, a theoretical framework of the monetary policy instruments to be used and their choices according to a certain macroeconomic context and the selected intermediate targets is made. Also discussed are the discordant points about the effect of money in the short and long term, as well as the objectives to be pursued by policymakers.

Section II presents the field of action of the National Bank of Angola from 2005 to 2017, its duties and obligations, without disregarding the statute that the law confers on it, it is also made an analysis of the selected intermediate instruments and variables to achieve the objectives to be pursued. And as well as an analysis of the instruments used to affect the supply of money in the economy. Being a (nominal) variable indirectly controllable by the monetary authorities in the sense to influence the financial system and the economic activity depending on the economic conjuncture. And finally, identify the variables used to estimate the money supply.

Finally, in section III, the analysis of the estimators and the respective interpretation of the generated results are done.

## 2. Literature Review - Basic Concepts Of Monetary Policy

The attempt to improve understanding of monetary policy begins with the analysis of the basic concepts. The vocabulary used in the monetary policy approach is generally universal, it does not impose any specific application in a particular country.

Monetary policy can be defined as a deliberate action by the monetary authorities to influence the quantity and cost of the currency in order to achieve desired objectives that guarantee the maintenance of macroeconomic equilibria. The implementation of this action is chosen by the operational variable which may be monetary aggregates or interest rates (such as their handling) in order to manage the amount of money in the economy. The importance of the currency in socio-economic life has made policy makers and other actors seek to design monetary policies of special recognition.

The conduct of monetary policy involves the process of setting objectives, choosing the instruments, as well as the operational and intermediate targets. Since the objectives of monetary policy are to increase employment, price stability as well as economic growth. While the monetary policy instruments: the

monetary authorities use to control the supply of money and the interest rate, ie to control the global liquidity of the economic system, being: the rate of mandatory reserves, rediscount operations and operations of open market.

### 2.1 Analysis of the Choice of Monetary Policy Instruments

A monetary policy to be effective must emit clear signals to the agents in order to stimulate them to act in the direction indicated by the policymakers. The sharper the policy signals, the safer and more confident the agents will be, as regards the monetary instruments that will be activated by the monetary authorities. However the ultimate goal of monetary policy is the welfare of society. While it is difficult to disagree with this objective, there is certainly wide divergence among economists on how to implement it in practice. Monetarists emphasize the stability of the price level; Keynesian economists prefer the level of employment. Thus some authors Keynes (1936), Klein (1949) and Davidson (1978). They argue that the objectives pursued by the monetary authorities consist of: (i) High level of employment; (ii) Ensuring price and currency stability; (iii) Ensure levels of economic growth. Friedman (1968) argues that monetary policy managers must pursue the monetary objectives that are controllable by their instruments, and if they follow the non-controllable ones, they may be the source of economic disturbances. Sargent and Wallace (1981) with the incorporation of rational expectations argue that a consensus has emerged in the new-classical economy, that the implementation of any monetary policy has effects on the real variables of the economy.

Barbosa (1996), the monetary policy instruments in a generic way, are variables that the central banks control directly and they are: (a) Open market operations are the operations conducted by the central bank with objectives to manage liquidity in the economy through the sale and purchase of securities in the market; (b) Rediscount rate - interest rates charged by the central bank to lend funds to commercial banks in case of emergency. (c) And the reserve requirement coefficients - consists of the regulation that concerns the minimum amount of reserves that commercial banks must keep on their deposits with the central bank. These instruments act on the monetary base (BM) influencing liquidity in the banking system.

**Table 1. Monetary Policy Instruments, Targets and Objectives**

Instruments	Operational Goals	Intermediate Goals	Objective
Discount rate, Required reserve, Open Market (OMA).	Monetary Base, Short term interest rate, Treasure Bill.	M1, M2, M3, Short and long term interest rate.	GDP growth, Employment, Stability of price and financial markets.

Source: Gichuki et al. (2012).

The problem of a central bank is aggravated by the fact that its instruments do not directly affect the

objectives set out in Table 1. These instruments affect variables such as money supply and interest rates, which then affect target variables with lags. The intermediate variables are between the instruments and the objectives (Gichuki, Oduor, & Kosimbei, 2012).

According to Bindseil (2004) a monetary policy instrument is a tool available to the central bank that can be used to achieve its operational objective. Operational target of monetary policy is an economic variable, which the central bank wants to control, and can actually control, to a very large extent on a daily basis through the use of its monetary policy instruments. An intermediate target is an economic variable that the central bank can control in a reasonable time, and which is a relatively stable or at least predictable position, with the ultimate goal of which the intermediate target is an important indicator. The typical intermediate target has been a monetary aggregate such as M1 or M3, the exchange rate, or some medium or long-term interest rate.

The choice of the use of the monetary policy tool by central banks occupies a wide discussion in the economic literature, if the target variable central bank is the money supply then must use the tools (monetary aggregates) and whether the target variable is the interest rate, then central bank should choose the interest rate as instrument.

According to Bindseil (2004) a monetary policy instrument is a tool available to the central bank that can be used to achieve its operational objective. Operational target of monetary policy is an economic variable, which the central bank wants to control, and can actually control, to a very large extent on a daily basis through the use of its monetary policy instruments. The choice of the use of the monetary policy tool by central banks occupies a wide discussion in the economic literature, if the central bank's target variable is the money supply then must use the tools (monetary aggregates) and whether the target variable is the interest rate, then central bank should choose the interest rate as instrument. According to the authors Gichuki, Oduor and Kosimbei (2012) to reach monetary policy objectives, central banks always have to decide whether they want to use interest rates or reserves (currency) as instruments. Solomon and Yaaba (2015), the choice of target and thus instrument variables depends on the structure of the economy, the nature and relative importance of different types of disturbances. If the central bank chooses the monetary aggregate, then it will have to let the interest rate be determined by market forces (through the money market). If the central bank opts for interest rates then monetary aggregate is determined by market forces.

For the choice of which instruments (interest rate and currency) the general conclusion is as follows: (i) if the main source of disturbance in the economy is shocks to the IS curve or the market for goods and services, use the coin offer is ideal. (ii) On the other hand, if the main source of disruption is shocks in the demand for currency or the financial markets or the LM curve, then interest rate target is ideal.

## *2.2 Monetary Policy Objectives in the Vision of Milton Friedman*

In relation to the objectives of monetary policy there is an extensive field of disagreement with its aims. According to Friedman (1968) over time monetary policy determines the nominal value of goods and services, i.e., the general level of prices. Changes in the price level indicate how the purchasing power

of the currency has changed over time. This conclusion is associated with confirmation, generally accepted that inflation is ultimately a monetary phenomenon. In other words, prolonged periods of high monetary growth are typically associated with high inflation. In the view of the author the objectives of raising the level of employment; guaranteeing price stability and currency as well as ensuring the levels of economic growth are not mutually compatible, i.e., the pursuit of one implies the abandonment of another. The same author argues further that the main attributions of monetary policy in the gold standard consisted in promoting price stability and preserving the value of gold given the state of speculation and the movement of gold. An efficient monetary policy should send clear signals to the agents in order to stimulate them to act in the direction indicated by policymakers. The author warns that there is great disagreement about the criteria of the conduct of the monetary policy and presents two limitations on the orientation and that seems to be intangible task of the same. It is unworkable to make: (A) Peg in the interest rate for more than the limited period; (B) and make peg in the real variables;

In relation to the first point, the peg in the interest rate for more than the limiting period, if the central bank intends to keep interest rates down. The initial impact of increasing the amount of money market finance will influence that interest rates become lower, but this is only the beginning of the process and not the end for the following three reasons: (a) The faster rate of Monetary growth will stimulate spending both through the impact on investment of lower market interest rates and through the impact on prices. (b) Rising incomes will increase liquidity preference in demand for loans and may also raise prices; (c) This price-increasing effect will reduce the actual amount of money. While the peg in the real variables as monetary policy objectives. This second limitation consists of the definition by the monetary authorities in relation to the persecution or peg in the real variables. The monetary authorities, in an attempt to solve this problem, could produce other problems and be the source of economic disturbances. Mishkin (2000) monetary policy is a flexible instrument to achieve the objective of price stability and is the main responsible for inflation, it does not affect economic activity in the long term, such as employment and output levels, to long term. The primary objective of monetary policy under the European Treaty is to make it clear that ensuring price stability is the most important contribution that monetary policy can make in order to achieve a favorable economic environment and a high level of employment (European Central Bank, 2001).

### *2.3 Objectives of Monetary Policy (Currency Neutrality) in the New Classics View*

The hypothesis of the existence of a natural rate of unemployment is the starting point for the construction of the new-classical corollary of the ineffectiveness of monetary policy. Such a hypothesis was formulated by Friedman (1968) as being that rate adequate to the Walrasian general equilibrium system that would incorporate the structural and institutional characteristics of the labor market and goods such as: imperfections, seasonal variations in demand and supply, cost and the time to collect information on available vacancies the cost and time of mobility from one job to another.

According to Sicsú (1997) the theory of classical monetary policy, starting from a situation in which the

natural rate of unemployment equals the current unemployment rate. In this situation, if the government announced an increase in the supply of money, agents would react to policymakers' decision exclusively by increasing their prices without hiring any additional workers. Thus, the current rate of unemployment would remain on the natural rate. In other words, the expansionist monetary policy decisions known to the agents would not cause any increase in the level of employment and real output, would simply increase the general price level equivalent to the increase in the stock of money. Thus, the term currency neutrality refers to the fact that currency is not capable of sustaining real output growth over the long term. A currency to be considered neutral does not mean that monetary policy should not be used to influence the product in the short term, only reports that this action would be temporary and that in the long term the product would tend to its natural level.

In the new-classic model, private agents fail because they are surprised. The surprise is always the result of the introduction of new variables in the real world or the unexpected change in the magnitude of existing variables and, therefore, part of the subjective model that processes the rational expectations of the economic agents. In the event that monetary interventions are not transmitted to the public, surprise occurs due to unanticipated changes in the currency stock, which result in expectation errors and consequently, some discrepancy between the current unemployment rate and the natural rate. In this sense, while the clarity of monetary policy for the new-classical theory seeks to reduce current unemployment, it should be a secret that should only be shared among policymakers, according to this last chain the element of surprise is indispensable. Entrepreneurs with information constraints due to the use of the element, even if they formed rational expectations, would misunderstand the movement of prices due to the variation of monetary stock and expand their production by hiring more workers, they would understand that the price increase would not be provoked by an increase in the money supply, but rather a real increase in demand for its products. Thus, firms would be encouraged to hire more workers than their potential, the current rate of unemployment would be lower than the natural rate.

However, after the time required for workers and entrepreneurs to understand that it was an unexpected variation in the money supply that led to an increase in production, they reworked their decisions, making the economy return to the point corresponding to the natural rate of unemployment. Monetary policy would be ineffective in reducing the natural rate of unemployment because the worker would perceive that the nominal higher wage did not mean a real increase in wages and entrepreneurs would perceive that the price increase was not relative to his favor, but rather an absolute and neutral.

#### *2.4 Coordination Versus Subordination of Monetary Policy (Postnes Keynesana View)*

The post-keynesian form of monetary policy, the coordination of the use of macroeconomic intervention instruments is fundamental. The more coordinated the monetary instruments are, the more efficient the monetary instruments are likely to be monetary policy.

Cairncross (1992) quoted by Siscú (1997) states that all instruments of economic policy interact, what happens when any instrument is used depends on the state of the other policy instruments and the

conditions prevailing at that moment. Each instrument uses a different transmission channel acting with varying timing and intensities, but all affect a single variable, the demand. Therefore, it is essential to coordinate the use of the various. Chick (1993) quoted by Sicsú, the criterion of the use of instruments should not be incorrectly understood as a subordination of monetary policy to the fiscal, as the author acknowledged in England in 1960, this practice stimulated the acceleration of inflation. This view left fiscal policy in a position of strength and monetary policy in a subordinate position. Tobin (1996) states that monetary authorities should not, and can not, escape responsibility for real macroeconomic results. When monetary management instruments are subordinated to fiscal objectives, monetary policy is not efficient. In the case of structures of subordination of monetary policy to fiscal, inflationary expectations of the agents become more nervous due to the learning that policies of expansion of the product are financed with the use of instruments that threaten the stability of prices.

In summary, the objectives that monetary policy should pursue vary from one current philosophical economy to another. Keynesian theories admit the possibility of monetary policy affecting real variables and recommend that it be used to reduce the unemployment rate and increase economic growth. The monetarist theories, on the other hand, do not see the possibility of the monetary expansion provoking a reduction in the unemployment, being that policies of this nature still cause an increase of the inflation. In this sense, they believe that the only objective of monetary policy should be price stability.

### *2.5 Monetary Policy View of the European Central Bank*

In the view of Gameiro et al. (2011) considers that monetary policy is conducted effectively, the central bank needs to have a large influence on money market interest rates and changes in these rates need to be transmitted to the rest of the economy. In addition to the definition of interest rates, the operational framework of monetary policy also has important implications for the financial system, operational aspects such as liquidity management influence the decisions of financial intermediaries, and consequently financial stability, as it has been clearly demonstrated in the recent financial crisis of 2008-2009. Finally, communication can also be seen as a monetary policy instrument that can influence financial stability through the effects on the agents' expectations.

## **3. Method**

### *3.1 Definition of the Means of Payment and the Monetary Base (Money Supply)*

In the context of macroeconomic policies, the central bank draws the assumption of the expansion of intermediate variable variables defined according to the quantitative currency equation, showing that there is a balance between the money market and the market for goods and services, a change in the supply of currency affects the other side of the equation by adjusting quantities or prices as shown in formula 1. The expansion of the means of payment must evolve to reach the goal of monetary policy and define its instruments to be used in order to achieve the result but efficient.

$$M2.V = P.Q \quad (1)$$

$$M2 = mm. BM \quad (2)$$

$$M2 = NMP + DT \quad (3)$$

$$BM = CM + RB \quad (4)$$

$$RB = RL + RO \quad (5)$$

**Where:**

M2: Represent Supply Money.

V: Velocity of Money;

NMP: Notes and Currency in Public Power

RB: Banking Reserves of Commercial Banks at the Central Bank;

RL: excess Reserve

BM: Monetary Base.

cm: Monetary Circulation

DT: Total Deposit.

RO: Required Reserve.

Adding equations (4) and (5) we have equation (6)

$$BM = CM + RL + RO \quad (6)$$

Dividing the means of payments and the monetary base both with DT - total deposits, we obtain an equation (7) and (8);

$$BM = (CM + RL + RO) * \frac{DT}{DT}$$

$$BM = (cm + rl + ro) * DT \quad (7)$$

The acronyms cm, r, and r represent the result of the Currency Circulation (CM) ratio, free reserves (RL), Mandatory Reserves (RO).

$$M2 = (NMP + DT) * \frac{DT}{DT}$$

$$M2 = (nmp + 1) * DT \quad (8)$$

Whereas the acronym nmp represents the result of the ratio of the Notes and Currency in Public Power.

Adding equation (7) and (8) we obtain equation (9)

$$mm = \frac{(1+nmp)}{(cm+rl+ro)} \quad (9)$$

Subsisting in equation (9) in (2) we obtain the following resulting:

$$M2 = \frac{(1+nmp)}{(cm+rl+ro)}. BM \quad (10)$$

On the basis of this result of formula (10) it can be concluded that an increase in one unit in the monetary base raises the supply of money by, but by one unit. It can induce an empirical analysis of the factors that feed or influence the monetary base a liability available in the balance sheet of the BNA, there are three great tools, being: (i) Fiscal policy, we can find the expenses of goods and services (in

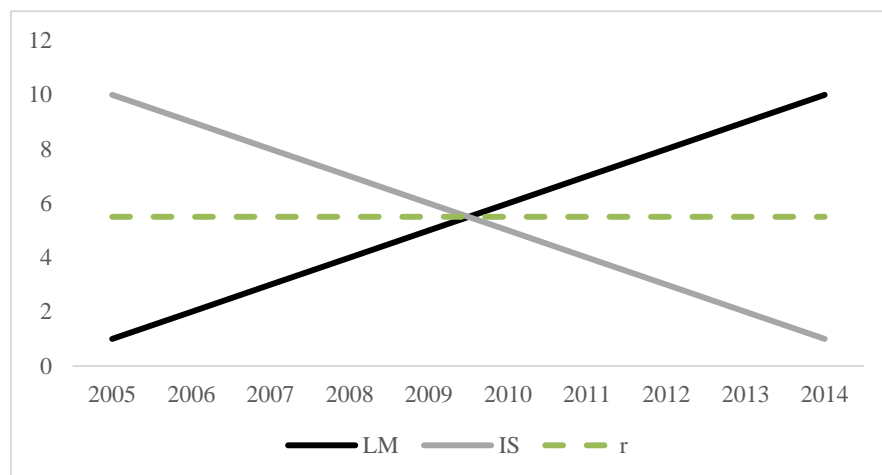


this item includes payments of wages) the liquidation of the public debt and the exterlization of currency by the Treasury; (ii) Monetary policy, in this item we have the policy instruments such as the rate of rediscounts, liquidation and liquidity absorption, the reserve requirements coefficients and the legal capacity of the central bank to issue new banknotes; (iii) And the exchange rate policy, we have the reserves flows that reflect the position of the country in relation to the rest of the world. As a result of this deduction, the multiple linear regression model (OLS) will be used to estimate the M2.

### 3.2 A Static Model

According to Poole (1970), he begins to suppose by presenting nonstochastic linear version of the Hicksian IS-LM model depicted in Figure 1. The model has the two equations. Figure 1 shows the familiar *IS-LM* diagram in which the price level is assumed constant. The monetary policy problem is viewed as setting the money stock at the level such that the *LM* function will cut the *IS* function at the full employment level of income,  $Y_f$ . Alternatively the policy problem could be viewed with the monetary authorities setting the interest rate at  $r^*$ , thereby making the *LM* function horizontal. In the deterministic model it obviously makes no difference whatsoever whether the policy prescription is in terms of setting the interest rate at  $r^*$  or in terms of setting the money stock at the level, say  $M^*$ , that makes the *LM* function cut the *IS* function at  $Y_f$ .

And the variables are all in real terms, equation (11), the *IS* function, is obtained by combining linear consumption and investment equations with the equilibrium condition  $Y = C + I$ . In equation (12), the *LM*-function, the left-hand side is the stock of money and the right-hand side is the demand for money. The parameters are not necessarily constant for all time; they may change as a result of fiscal policy measures and other factors. What is assumed is that the parameters are known period by period. The model has two equations and three variables,  $Y$ ,  $M$ , and  $r$ . Monetary policy selects either  $M$  or  $r$  as the policy instrument so that there are two endogenous variables and one exogenous variable, the policy instrument.



**Figure 1. A Nonstochastic Linear Version of the Hicksian *IS-LM***

Source: Searching authors.

$$Y = \partial_0 + \partial_1 r \quad (11)$$

$$M = \delta_0 + \delta_1 Y + \delta_2 r \quad (12)$$

**Where:**

$$r = r_0$$

$$\partial_1 < 0;$$

$$\delta_1 > 0, \delta_2 < 0;$$

### 3.3 Empirical Model Suggested in the Study

For our model we will use this approximation, for the interest rate we will use two instruments, being the required reserves in national currency and the basic interest rate of orientation of monetary policy and it is expected that they generate negative signals, or an increase of this instrument increases the price of the coin. GDP will be exogenous, this is a data provided by the National Institute of Statistics of Angola (INE) and is expected to generate a positive signal, that is, the increase of a greater economic activity is accompanied by a monetary expansion. International reserves in US dollars (RIL) it should be understood that an increase in (RIL) may require greater availability of kwanzas comes from this form captures the feat of the exchange rate policy as indicated in Figure 2 and is expected to have a positive impact. The price of petroleum must be understood here as capturing the effect of fiscal policy due to the revenues that are collected through the taxes of the oil companies operating in Angola, meaning that a higher collection of oil revenues resulting from higher oil prices may spur more expenses fiscal and as a result expand the means of payment in national currency M2 MN. The dummy's of the fourth quarter of 2011 and 2017 allow us to capture factors that are not explained variables but that have an impact on the equation as suggested in mathematical expression below.

$$M2MN = f(CRO^-, GDP^+, RIL^+, PP_{Brent}^+, TBNA^-) \quad (13)$$

**Where:**

M2MN: Money Supply; CRO: Required Reserve coefficient; RIL: Net International Reserve; Oil Price (Brent reference); TBNA: Monetary Policy interest rate.

### 3.4 Role Of The National Bank Of Angola - Its Instruments Goals And Objectives

The constitution of the Republic of Angola in its article 100, number 1, delegate's powers to the National Bank of Angola, as central bank and issuer, ensures the preservation of the value of the national currency and participates in the definition of monetary, financial and exchange rate.

Law 16/10, of July 15, is for the National Bank of Angola to implement the monetary policy in the country, its main objective being the preservation of the value of the national currency and, for this, it contributes to price stability in the country economy. In addition to the conduction, execution, monitoring and control of monetary, financial, exchange and credit policies within the economic policy of the Executive Branch, the National Bank of Angola is also responsible for:

- a) To act as sole banker of the State;
- b) Advise the Executive in monetary, financial and foreign exchange matters;

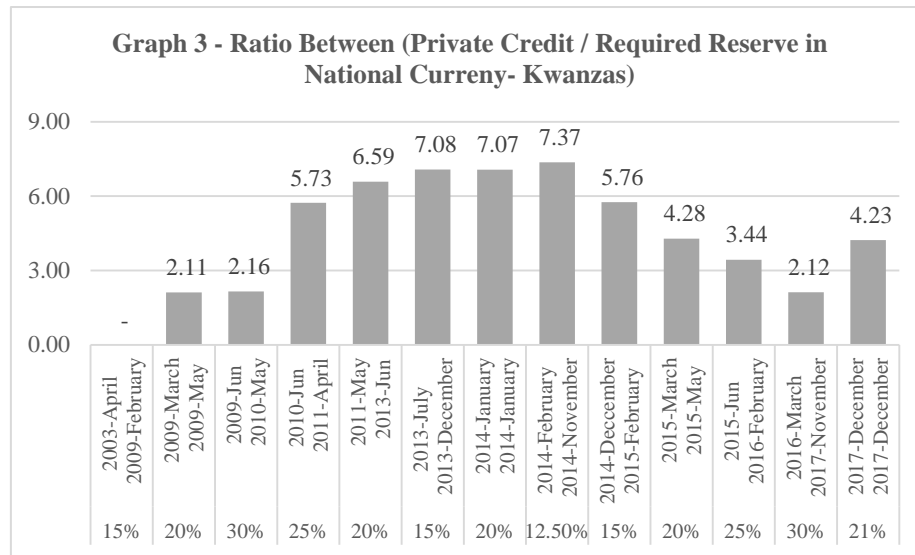
- c) Participate with the Executive Branch in defining, conducting, implementing, monitoring and controlling the exchange rate policy and its market;
- d) Acting, as an intermediary, in the international monetary relations of the State;
- e) To ensure the stability of the national financial system, ensuring, to that end, the role of financier of last resort;
- f) To manage the external availability of the country that is committed to it, without prejudice to the provisions of a special law.
- g) To participate in the elaboration of the annual financial programming of the Executive, in order to make compatible the management of foreign exchange reserves and the credit to be granted by the National Bank of Angola with the needs of stabilization and development of the economy.

At present, monetary policy has essentially the following instruments: obligatory reserves, placement of government bonds and, very recently, open market operations, rediscounts, liquidity-providing facilities, interventions in the foreign exchange market.

### *3.5 Administrations of Monetary Policy Instruments by the BNA to Achieve Its Objectives.*

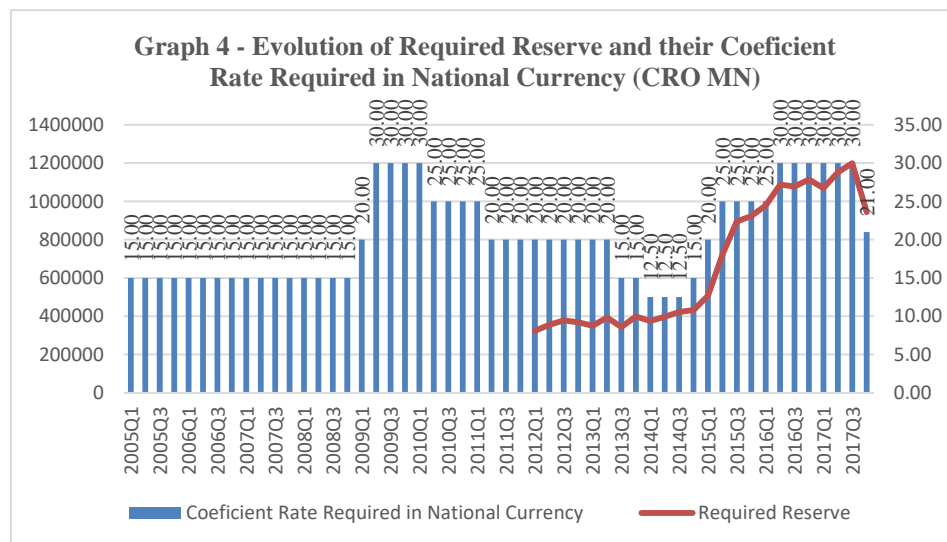
The monetary policy instruments used before in the new operational framework were the traditional ones, which include open market operations (OMA), ratio of required reserve (CRO) and discount rate (TR). The need to ensure the effectiveness of the instruments referred to in a context of growth in the weight of the Angolan financial sector in the economy leads the National Bank of Angola to introduce the Operational Monetary Policy Framework, allowing the deepening of the transmission channels and, by this way, on preserving price stability in the economy. As a result, other instruments were introduced in October 2011. In order to achieve its objective, the Central Bank has the following Monetary Policy Instruments: a) Permanent Lending Facilities and Liquidity Absorption; b) Open Market operations; c) Mandatory Reserves; d) Intervention in the foreign exchange market.

Thus, it is the responsibility of the Central Bank to complement its intervention through the Basic Interest Rate - BNA Rate, which will signal the market on the orientation of the Monetary Policy, Influencing the Structure of the Interest Rates of the Banking System, while also managing the liquidity of the system. This 2011 Operational Table shows the transition frontier from the nominal anchor to anchor the basic interest rate. These instruments were used in the monetary and interbank markets to restrict or expand the growth of the money supply and to make rules more efficient in the market and give clear signals of the conduct of the monetary policy for the economic agents as can be seen in Figure 2.



Source: Instructions and Notices - National Bank of Angola.

Note. Kwanza represent Angolan Currency;



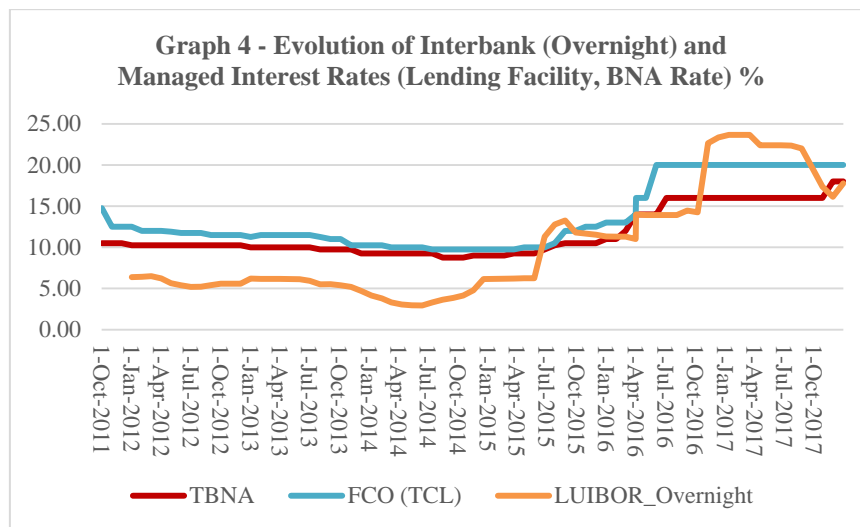
Source: Instructions and Notices - National Bank of Angola.

The trajectory of the coefficients of reserve requirements in national currency is visible, and in April 2003-February 2009 they stood at 15%, showing a restriction of monetary policy, i.e., rising and reaching a peak of 30%, even though during this period the mandatory reserves increased significantly as a result of their coefficients reaching a total of 656,602 million (kz), accumulating a flow of 61,090.13 million kwanzas. In June 2011 to May 2013 the reserve requirement coefficients reduced to 20%, showing an expansion of monetary policy in the liquidity of the banking system reaching the minimum in July 2013 to December 2013, also the increase in the credit ratio the private sector increased from 5.73% to 7.08%, illustrating a probable cycle of expansion of economic activity, it is also worth noting that in this period the mandatory reserves reached 398,554.42 million kwanzas, generating a flow of around 5,769.80 million of kwanzas. In January 2014 it rose again to 20%, in

February and November of the same year given the deterioration of the conditions (exchange crisis) and the reduction of the price of oil in the international market, some commercial banks began to present liquidity problems, leading the regulator to dramatically reduce CRO by 12.50%. From this period until November 2017 the CRO was set at 30%, reducing the ratio of credit to the private sector on the mandatory reserves from 5.76% to 2.46%. Finally, in December 2017 the CRO increased to 21% and the ratio improved from 2.46% to 3.55%.

Other operational instruments were also used cautiously, on the one hand, to accommodate the financial crisis, on the other hand to ensure price stabilization. The basic TBNA interest rate as the BNA-defined liquidity-providing facilities and the exchange rate were used to influence LUIBOR's behavior and to encourage financial institutions to reduce or increase lending rates between them and to have an impact in M2 MN.

It should be noted that since the beginning of the new operational framework of the monetary policy of the National Bank of Angola from October 2011 to May 2015 the three rates were moving in reaction of the basic TBNA rate, showing a decreasing trend of the same, showing the policymakers' power to stimulate the economy with the result of the financial and economic crisis. Since the pen-alising rate of lending facility was above, in the middle was the basic rate of orientation of the monetary policy TBNA and, below, it was found if the practical interbank rate between the two commercial banks in providing liquidity between them (LUIBOR overnight). But since the currency crisis that began in the second quarter of 2014, commercial banks began to present problems of solving their obligations in foreign currency, as a result of this situation aligned to their management, from 2015 some banks represented a risk to the financial system, which led some liquidity-lending banks to lend to those who were more risk-averse, so that the transferring banks increased their rates on the interbank money market (MMI), LUIBOR overnight even exceeded the two TBNA rates and FCO, while in MMI it was LUIBOR that best represented the risks associated with the market, which led banks to not follow the BNA indications.

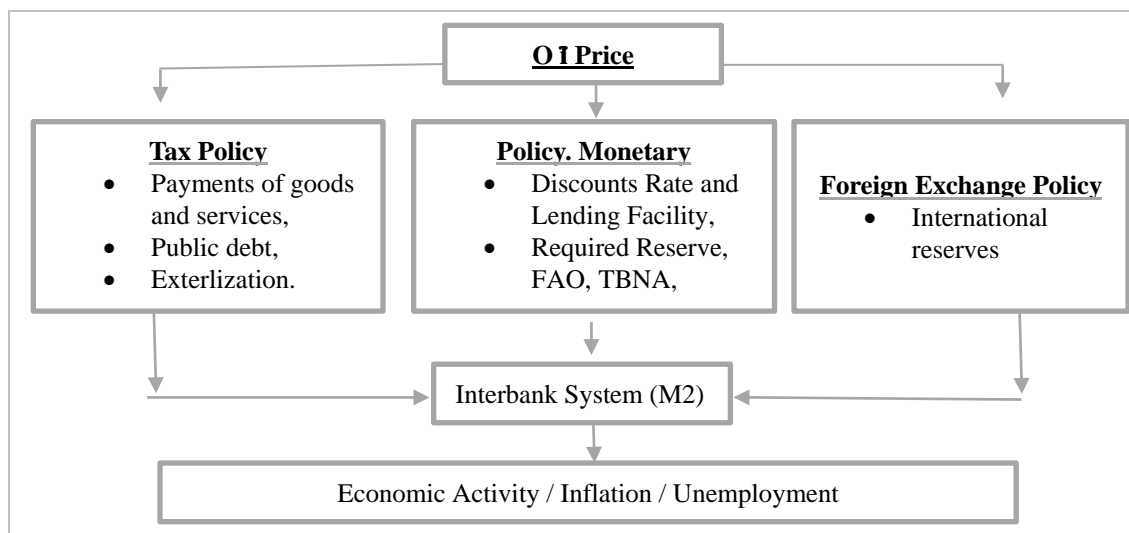


Source: Statistical Bulletin of the National Bank of Angola.

The mobility of these components on the fiscal, monetary and foreign exchange side effects the structure of the monetary base in the National Bank of Angola and the size of the liquidity in the interbank system, which may affect economic activity, inflation, unemployment, stability of the financial system and balance of payment.

The National Bank of Angola, in the framework of the agreements signed with international institutions, is obliged to fulfill certain goals defined by them, in the case of the International Monetary Fund (IMF) and the African organization of southern Africa SADC. The treaty that the country has with these organizations influences the definition of its intermediate goals, for example inflation, months of importation, public debt, etc. For this reason, the introduction of import months can be seen in the table (Operational Table of Instruments, Targets and Objectives) below.

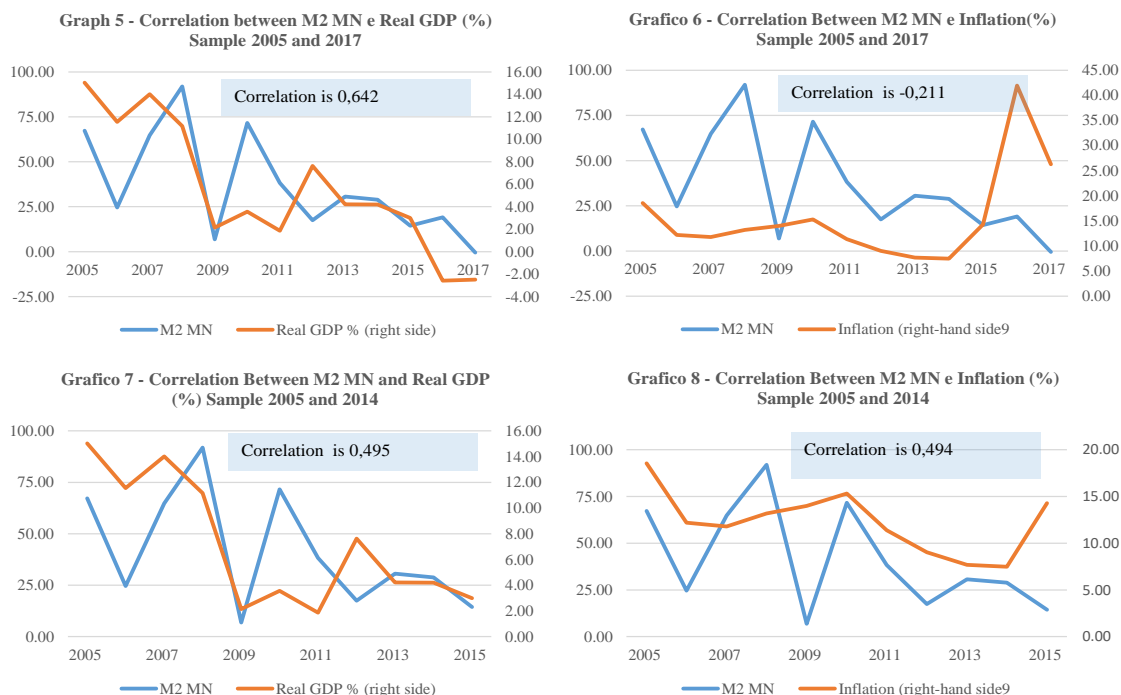
It can be seen that from 2005 to 2010, the reserve requirement coefficients and rediscounts were always used in an attempt by the monetary anchor to influence the financial system, leaving market forces to define the interest rate. In the period from 2011 to 2015 with the entry into force of the operational framework of monetary policy, with the incorporation of more instruments (variables) in order to influence the intermediate targets, it occurred, but the use of the anchor interest rate the definition of the basic TBNA interest rate for the orientation of monetary policy in order to influence other interest rates in the interbank market to LUIBOR (overnight) as shown in Figure 2. Also, in graph 5, 6, 7 and 8 it can easily be that there is a positive and strong linear correlation between the intermediate variable (M2 MN) and the objective variable Real GDP (%), being 0.642 in full sample and 0.495 for 2005 2014 (short sample), but there is also a linear positive and acceptable relationship between the intermediate variable and the variable also inflation target of 0.494 in short sample, but negative in full sample, both observed in graph below.



**Figure 2. Factors Affecting the Monetary Base**

Source: Author - Excel.

Note. Where FAO is Borrow Facility.



Source: Author - Excel.

## 4. Result

### 4.1 Linear Serial Correlation Test

The series provided are in a quarterly frequency, and the test carried out concludes that the coefficients of the reserve requirements in local currency lagged in 1 quarter have a negative and weak linear relationship, whereas, Real GDP (%) lagged in 5 quarters has a relation positive and weak, the net international reserves in dollars lagged in 5 quarters have a moderate but negative relation, and on the other hand the price of the outdated Brent in 1 period shows a positive and weak relation, and finally the TBNA has a negative and weak.

**Table 3. Linear Serial Correlation**

Description	DLOG (M2_MN)
DLOG (M2_MN)	1,00000
CRO_MN (-1)	-0,25115
GDP (-5)	0,29228
DLOG (RIL (-5))	-0,44774
DLOG (PP_BRENT_ (-1))	0,09934
D2017Q4	0,12875
D2011Q4	0,28013
TBNA	-0,21618

**Where:**

Dlog (M2\_MN): **Means of Payment in National Currency;**

CRO\_MN: **Coefficient of Reserves Required for Commercial Banks in National Currency;**

RIL: **Net International Reserves;**

D2011Q4: **Dummy Intervention Variable in the fourth quarter of 2014;**

D2017Q4: **Dummy Intervention Variable in the fourth quarter of 2017;**

TBNA: **Basic Interest Rate of Monetary Policy Orientation;**

$dlog(PP_{Brent})$ : **Brent oil price reference;**

**GDP: Real Gross Domestic Product.**

*Source:* Author - Excel.

#### 4.2 Data Used and Unit Root Test

After testing the linear correlation, it should be noted that series, net international reserves in foreign currency RIL (net international reserves in dollars), M2 MN, CRO (produced by BNA) and oil prices (Ministry of Petroleum) have been available since 2005, while Real GDP quarterly data provided by INE are available since 2010. The unit root tests suggest that almost variable studied are integrated of order 1 (- I (1) excluding Real GDP and CRO\_MN for a significance level of 1%, 5% and 10% probability.

**Table 4. Unit Root Test**

Variable	t-Statistic			Incluindo Intercepto na equação	
	Including Intercept in equation				
	ADF-Augmented		Order of	PP-Phillips-Perron	Order of
	Dickey-Fuller test statistic	Prob			
			Integration	test statistic	Integration
M2 MN	-3.91	0.0032*	I(1)	-7.96	0.0000*
GDP	-3.51	0.0143*	I(0)	-3.64	0.0106*
PP_Brent	-6.34	0.0000*	I(1)	-5.76	0.0000*
CRO_MN	-2.67	0.0851***	I(0)	-2.74	0.0721***
RIL	-4.05	0.0054*	I(1)	-4.05	0.0054*

*Note.* significant a \* corresponds to 1%, \*\* 5% and \*\*\* to 10%.

*Source:* Author Search.

#### 4.3 Estimation Interpretation of the Results

Measurable equation of the intermediate target (money supply M2 MN) for the Angolan economy in the period 2011q3-2017q1, for such a study, the required reserve coefficients are expected to reduce M2 MN as an increase in CRO\_MN limits or reduces the willingness of banks to cede credit to the



economy. The international reserves in dollars introduced to capture the effects of changes observed in the balance of payments, as measured by RIL (BNA or Ministry of Finance) when used sterilize the kwanza and contract or M2 MN.

The price of oil is introduced because it induces triple effect: (i) Influencing fiscal policy the fiscal magnitude depends in some way on the performance of this commodity in the international market; (II) Affecting the structure of the balance of payments, because of the magnitude of accumulated or lost flows of reserves; (III) Finally, affecting monetary policy because of the flows generated by both fiscal and exchange rate policies, the oil price is expected to show its positive coefficients.

Although it is not consensual in the long term, but in the short term, it expects that the action of monetary policy in an attempt to induce the increase of real money demand, stimulates positively GDP. That is, it is expected that the higher the level of economic activity, the greater the expansion of M2 MN. It is expected that the Basic Interest Rate of monetary policy stance will adversely affect monetary policy, assuming that the definition of this rate in the Monetary Policy Committee (CPM) affects monetary market expectations in the sense of expand or contract the money supply and these instruments are expected to show a negative sign in their coefficient. As indicated by the model proposed by the author, demonstrated in equation (2) according to mathematical expression (11) above.

$$\begin{aligned}
 dlog(M2_{MN}) = & \beta_1 + \beta_2 \cdot dlog(M2_{MN}(-1)) + \beta_3 \cdot (CRO_{MN(-1)}_{t-1} + \beta_4 \cdot dlog(GDP(-5)) + \\
 & \beta_5 \cdot dlog(RIL(-5)) + \beta_6 \cdot DLOG(PP\_BRENT(-1)) + \beta_7 \cdot (tbna) + \beta_8 \cdot DUMMY2011Q4 + \\
 & \beta_9 \cdot DUMMY2017Q4 \quad (14)
 \end{aligned}$$

$$\begin{aligned}
 DLOG(M2_{MN}) = & 0.162662 - 0.454148DLOG(M2_{MN}(-1)) + -0.004944CRO\_MN(-1) \\
 & \quad [2.839368]^* \quad [-2.766865]^* \quad [-1.100493] \\
 & +0.004944GDP(-5) - 0.028230DLOG(RIL(-5)) + 0.096556DLOG(PP\_BRENT\_(-1)) \\
 & \quad [1.581327] \quad [-2.701224]^* \quad [1.189706] \\
 & +0.093030D2017Q4 + 0.107311D2011Q4 - 0.000390TBNA \\
 & \quad [1.512678] \quad [2.018914]^{***} \quad [-0.039233]. \\
 R^2 = & 0.648036, \quad DW = 2.205967
 \end{aligned}$$

**Where:**

**CRO\_MN(-1): This is the lag one of requirement coefficiente;**

**DLOG (M2\_MN(-1)): Represent the lag one of Money Supply.**

Note: significant a [\*] corresponds to 1%, \*\* 5% and \*\*\* to 10%.

The model of the determinants of the money supply of the National Bank of Angola suggested that about 64.80% of the changes occurred in means of payments are explained by the independent variables.

While the result of the significance of each parameter suggested that the inertia of M2\_MN (-1) in national currency negatively affects M2 MN, showing its significant coefficient, i.e., a 1 percent increase in inertia in national currency increases M2MN in -0.45%. International reserves in dollars lagged over 5 periods are significant and negatively affect the M2MN, with a 1% Ril increase in dollars

affecting the means of payments in national currency at -0.02823 pp while the price of oil it affects positively, showing insignificant but with a correct theoretical signal, that is, a 1% increase in the price of oil expands the M2MN by 0.096556 percentage points. The TBNA shows insignificant but with an expected economic signal, it transmits a negative effect, that is, an acceleration of inflation in 1 percent expands the M2MN in -0.00038954.

## 5. Discussion

The normality test of the residues serial correlation and of heteroscedasticity suggest that the residues are normal presenting zero mean and constant variance. The serial correlation test for the H0-null hypothesis consists of an assertion that there is no serial correlation, and for the alternative hypothesis H1-the existence of serial correlation, the result falls into a region of non-existence of serial correlation with a probability above 10%. While the heteroscedasticity test consists of the definition of the null hypothesis H0 - non-existence of heteroscedasticity (constant variance) and the alternative hypothesis H1-the existence of heteroscedasticity, i.e., non-constant variance) and the test result falls in the acceptance region with a probability above 10%.

The Breusch-Pagan test is used to verify if there is no serial correlation between the residues. In the obtained results, the p-value is equal to 0,337 and 0,1655 paw the Model. The null hypothesis is not rejected, so it is accepted that the residues are not correlated or absence of serial correlation in a test with a significance level of 10%.

**Table 6. Serial Correlation Test - Breusch-Godfrey Serial Correlation LM Test**

F-statistic	1.176694	Prob. F(2,14)	0.337
Obs*R-squared	3.597707	Prob. Chi-Square(2)	0.1655

*Source:* Author of the paper.

Test of Heteroskedasticity is a test based on the Lagrange Multiplier (LM). This technique is widely used to test the null hypothesis of the presence of homoskedasticity in the regression model, against the alternative hypothesis that the error variances present a multiplicative function of one or more variables. The Breusch-Pagan test provides a result based on chi-square statistics. The hypothesis Ho represents homoscedasticity; if there is a rejection of Ho at a certain level of significance, then it is concluded that the model shows heteroskedasticity. The Breusch-Pagan-Gofrey test is used to check for heteroscedasticity in the waste. In the obtained results, the p-value is equal to 0.6685 and 0.5749 for the proposed Model. The null hypothesis is not rejected, so it is accepted that the residues are Homocedastic or non-heterocedastic in a test with a significance level of 10%.

**Table 7. Heteroskedasticity Test: Breusch-Pagan-Godfrey**

F-statistic	0.724654	Prob. F(8,16)	0.6685
Obs*R-squared	6.649044	Prob. Chi-Square(8)	0.5749
Scaled explained SS	2.461121	Prob. Chi-Square(8)	0.9635

*Source:* Author of the paper.

According to the corrollogram test of the residues, both Autocorrelogram and Partial Autocorrelogram, the tests indicate that the residues concentrate in the zone of acceptance of absence of constant auto correlation at the level of 10% of significance, given that their probabilities are greater than 10%.

Accordinting the normally test is widely known as the Jarque-Bera test. The test has as null hypothesis normality. Thus, if p-value is less than 5% (or 10%),  $p < 0.05$  ( $p < 0.10$ ), then normality is rejected. If  $p > 0.05$  is accepted, normality is accepted. Only the p-value will not tell how big the deviation from normality is. The Jarque-Bera test uses as parameters the coefficients of kurtosis and asymmetry (which in normal are 3 and 0, respectively). The Jarque-Bera test of normalities of residues, its results are concentrated in the region of acceptance that the residues are normally distributed, it is known that the result of the probability of Jarque Bera in the test carried out corresponds to 93.14% for the proposed model.

## 6. Conclusions

A monetary policy to be effective must emit clear signals to the agents in order to stimulate them to act in the direction indicated by the policymakers. The sharper the signs of policy, the more confident and confident the agents will be. However, the ultimate goal of monetary policy is the well-being of society. While it is difficult to disagree with this objective, there is certainly wide divergence among economists on how to implement it in practice. Monetarists emphasize the stability of the price level; Keynesian economists prefer the level of employment.

According to Law 16/10, of July 15, it is the responsibility of the National Bank of Angola to implement the monetary policy in the country, its main objective being the preservation of the value of the national currency and, therefore, to contribute to the stability of prices in the economy. In addition to conducting, executing, monitoring and controlling monetary, financial, foreign exchange and credit policies within the economic policy of the Executive Branch.

Before the new monetary policy operational framework, the monetary policy instruments used were the traditional ones, which included open market operations (OMA), compulsory reserve ratio (CRO) and rediscount rates (TR); with the new operational framework of monetary policy approved in October 2011, other instruments were introduced, such as: (1) TBNA basic interest rate; (2) Interest rate of absorption and transfer of liquidity permanently.

To conclude by saying that the objectives initially recommended were achieved, that is, knowing the impact of the intermediate variable on the objective variables or vice versa. As the instruments (CRO

MN) and (TBNA), the same variables and (RIL (-5)) negatively affect the intermediate variable (M2 MN), while the (GDP) and GDP (-5) affect positively. The results of the coefficients generated by the model of the determinants of the money supply of the National Bank of Angola suggested that about 64.804% of the changes occurred in means of payments are explained by the independent variables.

The major limitation of this work is not to have a quarterly sample not satisfactory, and the existing monthly some variables are only available from 2011 this somewhat limit is may infer some conclusions ambiguous or not satisfactory.

The redefinition of objectives throughout the year is a sign that some information fails in macro executive programming because some objectives of nominal variables such as inflation are defined at the beginning of each year, sometimes in the middle of the year the objective is already exceeded and it becomes to redefine new inflation targets, this provides a sign of uncertainty in the economy of information or programming deficiency, i.e., some variables are being underestimated, so one should avoid redefining constant objectives throughout the calendar year .

The exchange problems must be solved either through diversification of the economy and the consequences of export diversification, since most of the inputs used in the production process depend on imports, i.e., large flows of external resources enter the balance of payments and also because of the level of imports. Thus, the exchange problems affect: (a) The performance of economic activity, which may cause large shocks in the market for goods and services on the supply side; (b) as well as in the supply of foreign exchange in the foreign exchange market. Therefore, this procedure may impede the effectiveness and efficiency of economic policy instruments and therefore affect the objective variable. The choice of the use of operational tools by the BNA anchor nominal (monetary base) or interest rate should be clear, as the use of the tools will define the functioning of the economy, whether in the real sphere or also financial. The National Bank of Angola should not have too many illusions to affect the real variables in the long term since it is known that it is neutral. But you can use the intermediate variables to be able to affect the objective variable in the short term. The central bank must be, but communicative, and issue clear signals in the economy according to its master lines, although not all information is disclosed to the public taking into account the surprise effect of a policy. And finally, the clear definition of the objectives that the BNA can have and not accommodate the fiscal policy, when this happens many objectives of the central bank should be redefined depending on the state of the fiscal policy. The work is not conclusive because it opens a field of discussions for future authors that can contribute with the research done and criticizing or improving it.

## References

- Barbosa, F. H. (1996). *Monetary Policy: Instruments, Objectives and Experiences Brazilian*.  
Chick, V. (1993). *The Theory of Monetary Policy Oxford: Blackwell*.  
Davidson, P. (1978). *Money and the Real World*. London: Macmillan Press.  
European Central Bank. (2001). *The Monetary Policy of the ECB*.

- EvIEWS 8. (2013). *Estimation Forecasting Statistical Analysis Graphics Data Management Simulation*. Finance, Ministry Of. (2001). *Imperative of the Sterilization of Foreign Currency Inflows of the Petroleum Sector for Macroeconomic Stability*. Luanda, Angola.
- Friedman, Milton. (1968). *The American Economic Review - The Role of Monetary Policy*.
- Gameiro, Isabel Marques, Soares, Carla, & Sousa, João. (2011). *Economic Bulletin: Monetary Policy and Financial Stability: An Open Debate*. BANCO DE PORTUGAL.
- Gichuki, James, Oduor, Jacob, & Kosimbei, George. (2012). *The Choice Of Optimal Monetary Policy Instrument For Kenya*, *Management Journals* managementjournals.org, 1(9), 01-23.
- Klein, L. (1949). *The Keynesian Revolution*. New York: MacMillan Company.
- Kydland, F. E., & Prescott, E. C. (1997). Rules Rather than Discretion: The Inconsistency of Optimal Plan. *Journal of Political Economy*.
- Maccallum, B. T. (1995). *Two Fallacies Concerning Central Bank Independence*, *American Economic Review Papers and Proceedings*.
- Mishkin, F. S. (2000). *What should Central Banks do? Federal Reserve Bank of St. Louis Review*.
- National Bank Of Angola. (2003). *INSTRUCTION NO. 06/2003 of February 7*.
- National Bank Of Angola. (2011). *NOTICE No. 12/2011 of October 2011*.
- National Bank Of Angola. (2012). *First National Treasury Meeting - Importance of Currency in Economy*. Luanda.
- National Bank Of Angola. (2012). *Law on The Exchange Rate Regime Applicable to the Oil Sector*, No. 20/2012 of April 12 - Law No. 2/12. LUANDA: BNA-LUANDA.
- National Bank Of Angola. (2012). *LUIBOR - Published in the Diário da República, I series, no. 63, of April 2 - NOTICE No. 13/2012 of April 2*.
- Poole, William. (1970). Optimal Choice of Monetary Policy Instruments in a Simple Stochastic Macro Model. *The Quarterly Journal of Economic*, 84(2), 197-216. <https://doi.org/10.2307/1883009>
- Sargent, T., & Wallace. (1981). *Rational Expectations and the Theory of Economic Policy*.
- SICSU, João. (1997). *Denial of Inefficiency of Monetary Policy: The Keynesian Alternative and Keynesian Post*.
- Taylor, John B. (1993). *Discretion versus Policy Rules in Practice*, *Carnegie-Rochester Conference Series on Public Policy*.
- Tobin, J. (1996). *Essays in Economics: National and International*. Cambridge: MIT Press.
- Ulrich, Bindseil. (2004). *The Operational Target Of Monetary Policy And The Rise And Fall Of Reserve Position Doctrine*.
- Yaaba, Solomon, Udom, I., & Baba, N. (2015). Determining the Optimal Monetary Policy Instrument for Nigeria. *CBN Journal of Applied Statistics*.

## Appendix

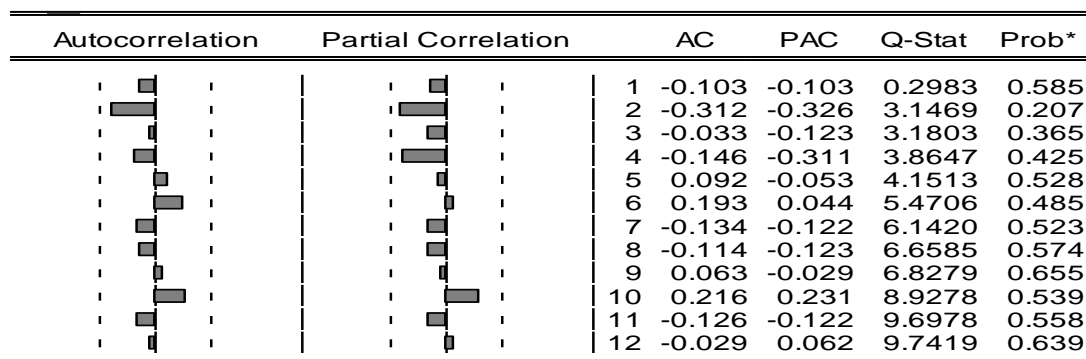


Figure 3. Autocorrelation and Partial Coefficients

Source: Job Search.

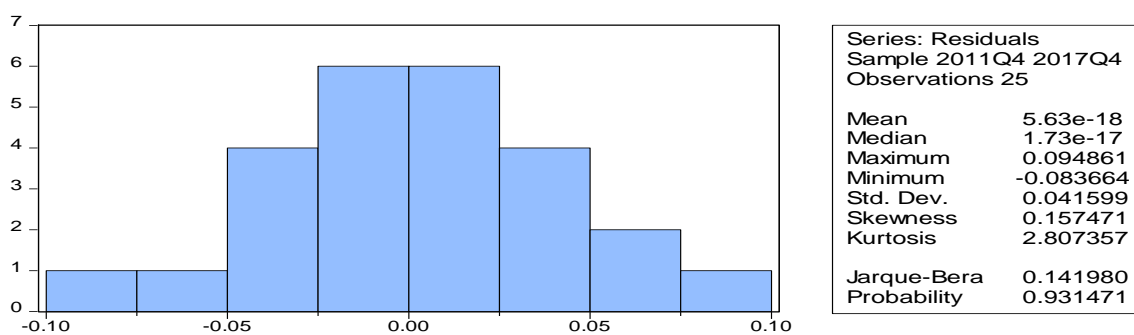


Figure 4. Normality Test of Model

Source: Job Search.